REMARKS

Claims 27-31 having been previously canceled, Claims 1-27 are now presented for examination. Claims 1, 6, 10, 15, 19 and 24 are the only independent claims.

Claims 1-27 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. patent application publication number 2004/0233407 to Nishi et al. This rejection is respectfully traversed.

Pending independent Claims 1, 10 and 19 are directed to projection exposure apparatus using a mask that includes plural columns of a mask pattern for repeated exposure to a member to from plural columns of an exposure pattern thereon. In the apparatus, an illumination system irradiates light to the mask. A projection system projects the light from the mask onto the member. An exposure stage moves the member and a mask stage moves the mask. A controller controls light irradiation from the illumination system to the mask, drives the exposure stage and drives the mask stage. The controller alternately performs the light irradiation and step driving of the exposure stage to move the member by an amount equal to n times the pitch of the columns of the exposure pattern. The controller performs step driving of the mask stage to move the mask by a movement amount equal to n times the pitch of the columns of the mask pattern in association with step driving of the exposure stage in an early phase and a later phase of the repeated exposure where n is a natural number smaller than the number of columns of the mask pattern.

In Applicants' view, Nishi et al. discloses a scanning exposure apparatus that exposes a sensitive substrate by projecting a pattern formed on a mask onto the sensitive substrate while moving the substrate. The apparatus has a projection system, a stage system, a first detector and

a control system. The projection system is disposed in a path of an exposure beam and projects a pattern image onto the substrate. The stage system is disposed on an image plane side of the projection system, and has first and second stages, each of which is movable independently in a plane while holding the substrate. The first detector detects focusing information of a vicinity of an outer circumference of the substrate during a detecting operation. The control system controls the stage system to perform the detecting operation with the first stage, while performing a first exposure operation with the second stage, the substrate held by the second stage being exposed in the first exposure operation. After finishing the first exposure operation, a second exposure operation for the substrate on the first stage is performed, in which a shot area in the vicinity of the outer circumference of the substrate held by the first stage is exposed by moving the first stage in a scanning direction while adjusting a surface position of the substrate held by the first stage based on the detected focusing information.

According to the invention defined in Claims 1, 10 and 19, a mask includes plural columns of a mask pattern for repeated exposure to a substrate member to form columns of the exposure pattern on the substrate member. The member is moved by an amount of n times the pitch of the columns of the exposure pattern where n is a natural number smaller than the number of columns of the mask pattern. The step driving of the mask stage moves the mask by a movement amount equal to n times the pitch of the columns of the mask pattern in association with the step drive of the exposure stage in the early and later phases of the repeated exposure. Advantageously, a large size member may be exposed using a small size mask and the whole

area corresponding to each column of the exposure pattern is exposed and then each column is formed through the plural light irradiations of the plural exposure processes and the exposure in the early and later phases is as appropriate as in the intermediate phase.

Nishi et al. may teach an exposure process in which a pair of wafers are processed with different sections of each wafer being sequentially exposed using a mask. As clearly shown in Nishi et al., an exposure pattern corresponding to the mask pattern is formed on a shot area of the wafer through a one time exposure. After completion of the exposure of a first shot area, the substrate is moved by an amount larger than the mask pattern and an exposure pattern is formed on a second shot area different than the first shot area by another one time exposure. In contrast to Nishi et al. wherein there is a one time exposure of each different shot area using a mask pattern larger than the shot area, it is a feature of Claims 1, 10 and 19 that a member to be exposed is moved by an amount n times the pitch of columns of an exposure pattern, n being a natural number smaller than the number of columns so that one exposure pattern is formed on a member through multiple exposures with a mask pattern that is smaller than the member.

It is a further feature of Claims 1, 10 and 19 that, in the early and later phases of the repeated exposure of the member to the mask pattern columns, the mask stage is moved by an amount n times the pitch of the columns of the mask pattern in association with the drive of the exposure stage. As a result, the exposure amount is the early and later phases is the same as the exposure amount of the intermediate phase. It is not seen that Nishi et al.'s movement of a wafer by an amount larger than the mask pattern between one time exposures could possibly teach of suggest providing the nx pitch of columns movement of both mask stage and exposure stage in early and later repeated exposures of mask pattern columns and the nx pitch of columns

movement of the exposure stage in the intermediate repeated exposures as in Claims 1, 10 and 19. In at least the foregoing respects, it is believed that pending Claims 1, 10 and 19 are completely distinguished from Nishi et al. and are allowable.

Pending independent Claims 6, 15 and 24 are directed to projection exposure arrangements using a mask that includes plural columns of a mask pattern for repeated exposure to a member to form plural column of a mask pattern thereon. In the apparatus, an illumination system irradiates light onto the mask. A projection system projects the light from the illumination system onto the member. An exposure stage moves the member. A light shielding member stage shields light to prevent light projection onto the member from some of the plural column of the mask pattern. A light shielding member stage moves the light shielding member. A controller controls light irradiation from the illumination system to the mask, driving the exposure stage and driving the light shielding member stage. The controller alternately performs the light irradiation and step driving of the exposure stage to move the member by a movement amount of n times the pitch of the columns of the exposure pattern. The controller performs step driving of the light shielding member stage to move the light shielding member by an amount corresponding to a pitch of n columns of the mask pattern in a light projection region on the member in association with step driving of the exposure stage in the early phase and the later phase of the repeated exposure where n is a natural number smaller than the number of the columns of the mask pattern.

As discussed with respect to Claims 1, 10 and 19, Nishi et al. on teaches movement sequences of a mask on shot areas of a wafer in which the wafer is moved by an amount larger than the mask pattern between one time exposures of shot areas. In contrast to Nishi et al., it is a

feature of Claims 6, 15 and 24 that a mask is used which has plural columns of a mask pattern for repeated exposure of a member to form plural columns of an exposure pattern on the member in which a controller moves the member for the repeated exposure by an amount equal to n times the pitch of the columns of the exposure pattern where n is a natural number smaller than the number of mask pattern columns. It is not seen that Nishi et al.'s wafer movement by an amount larger than the mask pattern between one time exposures of shot areas could possibly suggest the repeated exposure with movement of the member by n times the pitch of the mask pattern columns of Claims 6, 15 and 24.

It is a further feature of Claims 6, 15 and 24 that a light shielding region is moved by an amount corresponding to the pitch of n columns of the mask pattern in association with the movement of the exposure stage in the early and later phases of repeated exposure so that the light shielding member is moved together with the member to be exposed to prevent insufficient exposure at start and end sections of the member. It is not seen that the movable blind 64 of Nishi et al. which only functions to prevent illumination light from leaking outside a shielding area at a shot edge portion of a reticle during scanning exposure could possibly teach or suggest this further feature of Claims 6, 15 and 24. Accordingly, it is believed that pending Claims 6, 15 and 24 are completely distinguished from Nishi et al. and are allowable.

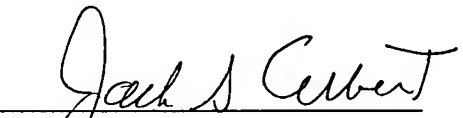
For the foregoing reasons, Applicants submit that the present invention, as recited in independent claims 1, 6, 10, 15, 19 and 24, is patentably defined over the cited art, whether that art is taken individually or in combination.

Dependent claims 2-5, 7-9, 11-14, 16-18, 20-23 and 25-27 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of the dependent claims is requested.

Applicants further submit that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the objection and rejections set forth in the above-noted Office Action, and an early Notice of Allowance are requested.

Applicants' attorney, Steven E. Warner, may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,



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